MAKING THE NATION SAFER:
THE ROLE OF SCIENCE AND TECHNOLOGY IN COUNTERING TERRORISM

Statement of

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before the

Science Committee
U.S. House of Representatives

and

Science, Technology, and Space Subcommittee
Commerce, Science, and Transportation Committee
U.S. Senate

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Good morning, Mr. Chairmen and members of the Committees. We are Dr. Lewis M. Branscomb, Emeritus Professor of Public Policy and Corporate Management; and Emeritus Director of the Science, Technology, and Public Policy Program in the Center for Science and International Affairs at the John F. Kennedy School of Government of Harvard University, and Dr. Richard D. Klausner, Executive Director of Global Health for the Bill and Melinda Gates Foundation. Together we served as co-chairs of the Committee on Science and Technology for Countering Terrorism of the National Academies' National Research Council. We are here today to discuss the contents of this committee's report: *Making the Nation Safer: The Role of Science and Technology in Countering Terrorism*.

The study was initiated shortly after September 11 by the action of the three presidents of the Academies -- the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine -- working through their shared operating arm, the National Research Council. More than 100 scientific and technical experts volunteered to work on this very complex project, completed in a short amount of time. The report also benefited substantially from the expertise of an additional 46 experts who reviewed the report to ensure its accuracy and quality. All of the costs for the project were paid for by the National Academies.

Our report describes many ways in which science and engineering can contribute to making the nation safer from the threat of catastrophic terrorism. It identifies key actions that can be undertaken now, based on knowledge and technologies in hand. Equally important, it describes key opportunities for reducing current and future risks even further through longer-term research and development

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activities.

The report is organized around the ways in which science and technology can address the potential threats and vulnerabilities terrorists might exploit. However, it is not simply a catalog of vulnerabilities, and we were careful to describe vulnerabilities only to the extent necessary to justify our technical recommendations.

Chapters cover the following issues: nuclear and radiological threats; human and agricultural health systems; toxic chemicals and explosive materials; information technology; energy systems; transportation systems; cities and fixed infrastructure; the response of people to terrorism; and complex and interdependent systems.

We include a box in the executive summary highlighting important actions that should be taken without delay (a copy of this box is attached to this testimony). Seven immediate applications of existing technologies and seven urgent research opportunities are listed there. For example, technologies are available that can be implemented to improve emergency communications, produce vaccines and antibodies, and strengthen security around power grids. The government should also ensure that trusted spokespeople are prepared to inform the public promptly and with technical authority in the event of an emergency.

However, many of the threats require new technologies which we believe can be developed,

given a concerted research effort. For example, vaccines and treatments can be found for infectious

agents that currently are untreatable. The distribution of electric power can be made more reliable by

developing an adaptive electric-power grid that would be less vulnerable to attacks and widespread

failures. Computer programs that make it much easier to 'connect the dots' among apparently unrelated

fragments of information can improve intelligence gathering. These are only a few examples.

The actions suggested in our report target all phases of counterterrorism -- intelligence and

surveillance, prevention, protection, interdiction, response and recovery, and attribution. However,

which phase is most important depends on the threat. For example, the nuclear threat must be

addressed in the earliest stages through collaboration between the United States and other nations and

deployment of effective protection and control systems to prevent terrorists from getting their hands on

nuclear weapons and materials. For biological attacks, the situation is reversed: an attack is relatively

easy to initiate and hard to prevent, but there are many opportunities for biomedical intervention, using

new science, to mitigate the effects of an attack. In other cases, such as an attack on the electrical

power system, it is possible both to make the attack more difficult to undertake and to lessen its effects

after it has been initiated.

For the existing and future technologies described in the report to make the nation safer, they

will have to be effectively implemented. A piece-meal approach to defending a critical facility or system

will be ineffective, and decisions about what technologies to use and how to use them should be based

on a view of the problems and solutions that takes the whole system into account. The government can

help by increasing understanding of critical systems' vulnerabilities and by setting standards for security

technologies and creating testbeds and methods for evaluating their performance under realistic

circumstances.

The government officials running the Office of Homeland Security, or, when it is created, the

Department of Homeland Security, will need a strong analytical capability to help them make informed

decisions and implement strategies that will work. The committee recommends that a Homeland

Security Institute be established as soon as possible to provide technical information to support

decisions that must be made by the director of homeland security, and later by a secretary of the

homeland security department. This institute would be a dedicated, nonprofit, contractor-operated

organization. Experts hired by the institute would provide analysis, simulation, and modeling to identify

vulnerabilities and assess the effectiveness of steps taken to reduce them.

To ensure that all the technical components of a new Department of Homeland Security work

together and in collaboration with other agencies, the Department will need an undersecretary for

science and technology, to whom the institute should report. However, the current Office of Homeland

Security should be given the authority to create the Homeland Security Institute now, rather than waiting

for a department to be formed first.

The close collaboration already taking place between the White House Office of Science,

Technology, and Policy and the Office of Homeland Security will become even more critical with the

establishment of a Department of Homeland Security. A strengthened OSTP can help ensure that the research-oriented agencies are responsive to the needs of homeland security. This is particularly important since the agencies that will be incorporated in a new department tend not to have the deep-rooted research and development capabilities found in other agencies.

Although the report is directed primarily to the federal government, it is intended to benefit all essential partners in the war on terrorism. A good working relationship is needed between the government and industry when it comes to counterterrorism. Much of our critical infrastructure is privately owned and operated, but the threat of terrorism does not create a market force to which industry easily responds. The federal government also needs to work closely with local municipalities who are the first to respond to a terrorist attack and can provide valuable insight into research and development needs.

The university and industrial research community also represent an enormous creative resource for meeting the challenge of catastrophic terrorism. But for the basic science and engineering laboratories to make their most effective contribution, a balance must be struck between the need to protective sensitive information and the requirements for an open, creative research environment that promotes good science.

Finally, whenever possible, researchers should seek out counterterrorism technologies that have ancillary benefits for society to help make terrorism protection more affordable and to ensure that the

public's commitment to the struggle against catastrophic terrorism is sustainable.

In closing, we would like to thank the committees for their invitation to testify and for allowing us to present our views. Now, we would be glad to answer your questions. Several members of our committee are here to provide expertise in specific areas, and they too would be glad to answer any questions.

Attachment 1: *Making the Nation Safer: The Role of Science and Technology in Countering Terrorism*, the report of the National Academies' National Research Council's Committee on Science and Technology for Countering Terrorism.

Attachment 2: Other Members of the Committee on Science and Technology for Countering Terrorism present at the hearing:

John L. Hennessy
President, Stanford University
Member, Committee on Science and Technology for Countering Terrorism
Co-Chair of the Committee's Panel on Information Technology

Paul H. Gilbert
Director Emeritus, Parsons Brinckerhoff Inc.; and Senior Vice President, Parsons Brinckerhoff International Inc.
Member, Committee on Science and Technology for Countering Terrorism
Chair of the Committee's Panel on Energy Facilities, Cities, and Fixed Infrastructure

William Happer
Professor, Department of Physics, Princeton University
Member, Committee on Science and Technology for Countering Terrorism
Chair of the Committee's Panel on Nuclear and Radiological Issues

Ashton B. Carter
Ford Foundation Professor of Science and International Affairs, John F. Kennedy School of Government, Harvard University
Member, Committee on Science and Technology for Countering Terrorism

L. Paul Bremer III
Chairman, Crisis Consulting, Marsh and McLennan Companies Inc.
Member, Committee on Science and Technology for Countering Terrorism